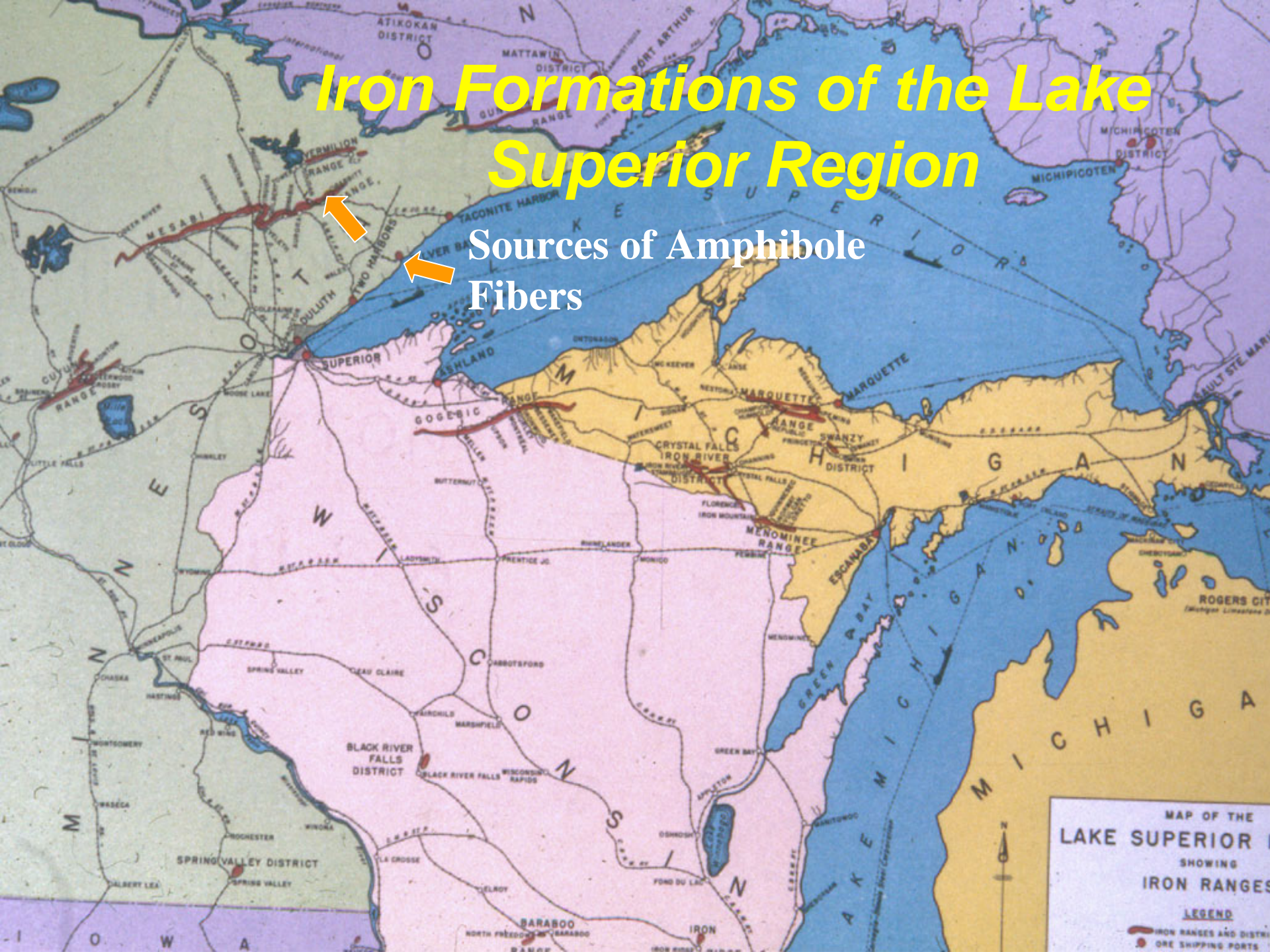


## ***Properties of microscopic fibers that indicate potential for causing asbestos-like pathologies***

- Size and shape that allows respiration, retention in lungs, and translocation to pleura
- Durable, persistent in tissues
- Aspect ratio  $> ?$  Thinness
- Reactive surfaces, ability to induce ROS
- High collective surface area
- Propensity to split into thin fibers *in vivo*

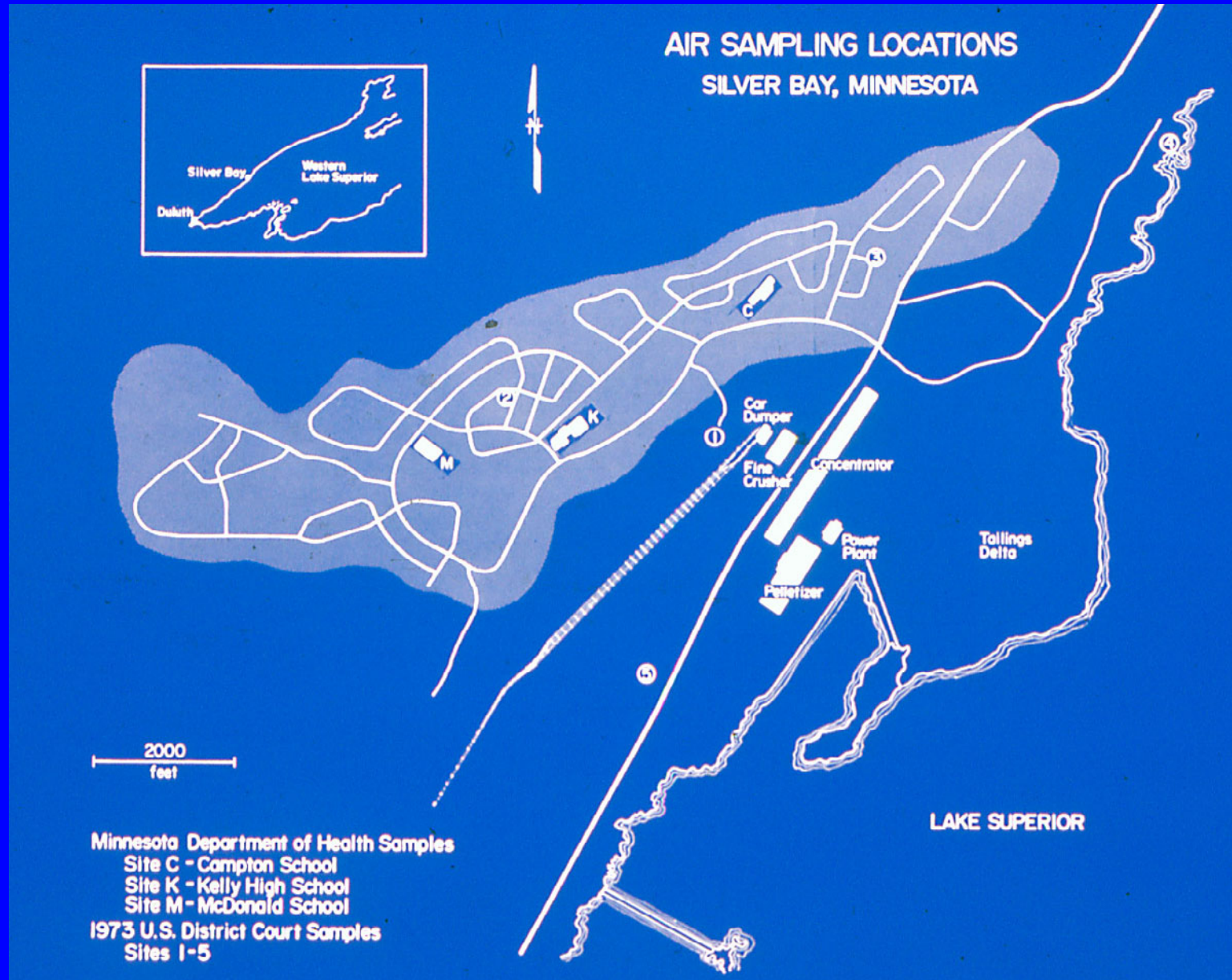
# Iron Formations of the Lake Superior Region

Sources of Amphibole Fibers





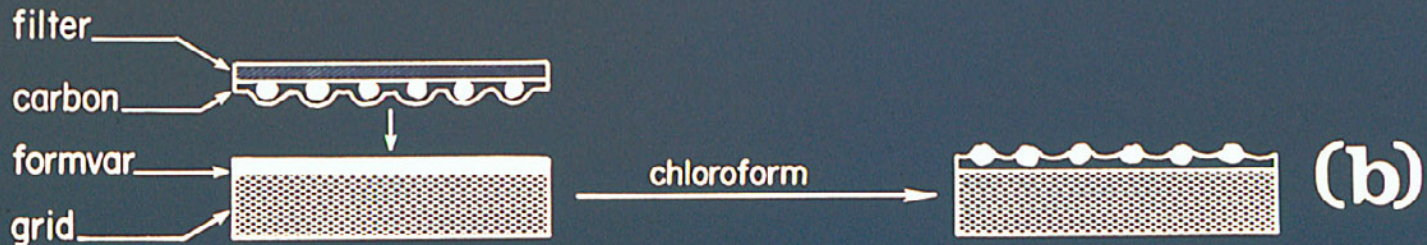
# Monitoring Amphibole Fiber Concentrations in Community Air



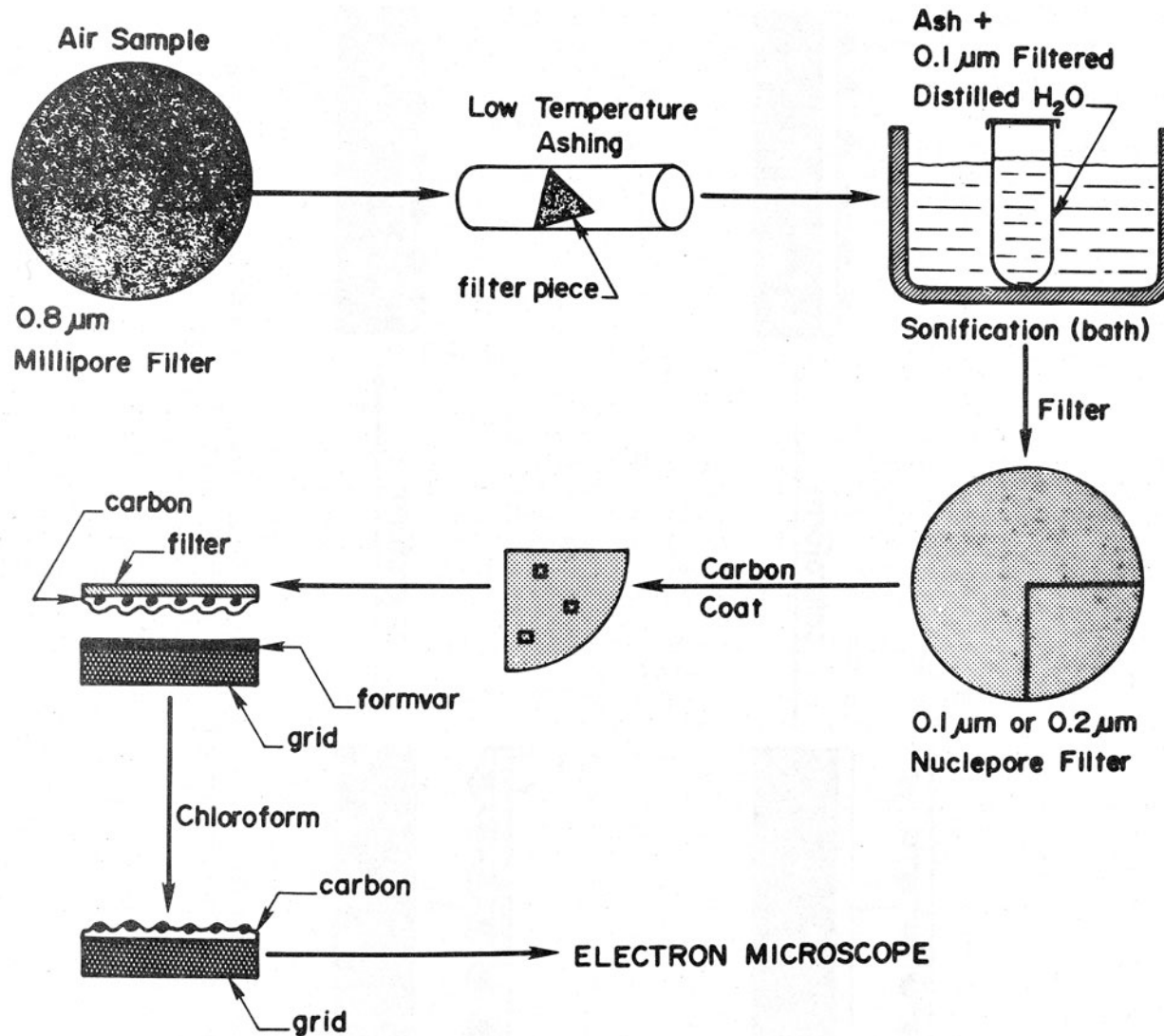


# 1970s - Fundamental Method for Preparing Grids for Quantitative Particle Analysis with Analytical TEMs

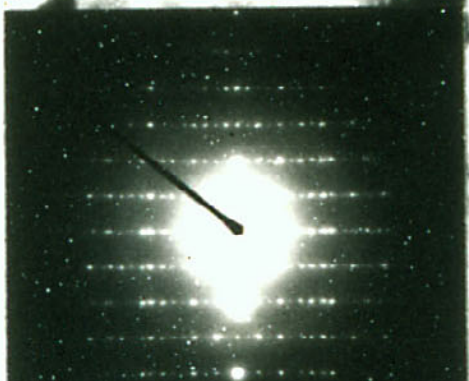
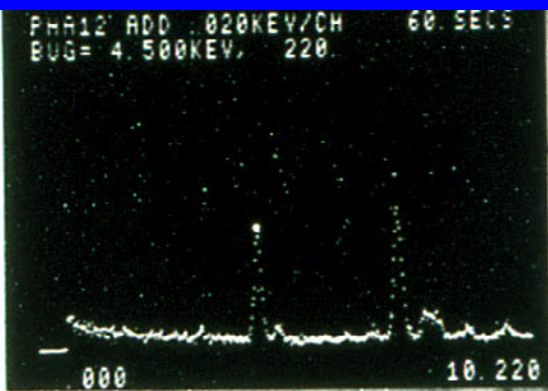
## DIRECT TRANSFER METHOD FOR PREPARATION OF ELECTRON MICROSCOPE GRIDS FOR PARTICLE COUNTING



# Transfer of Air Samples to Electron Microscope Grids



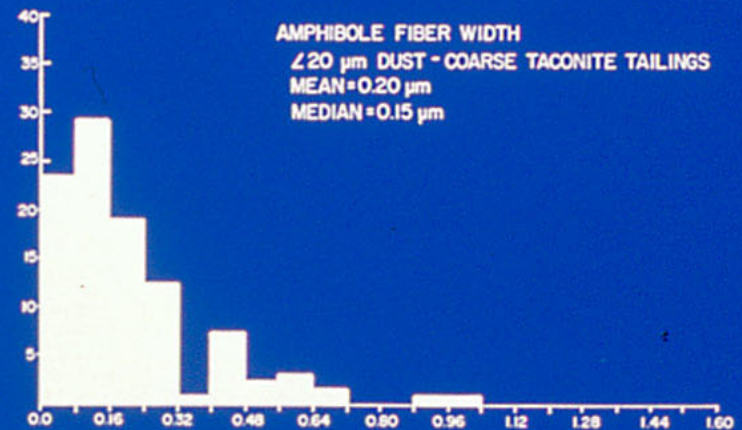
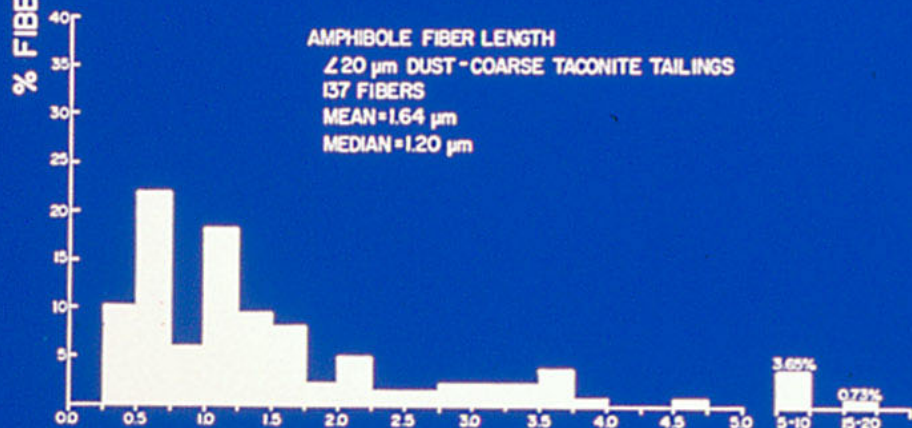
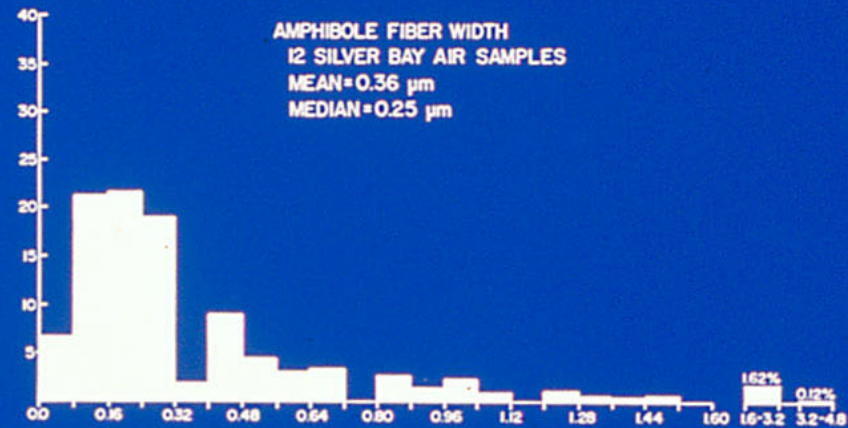
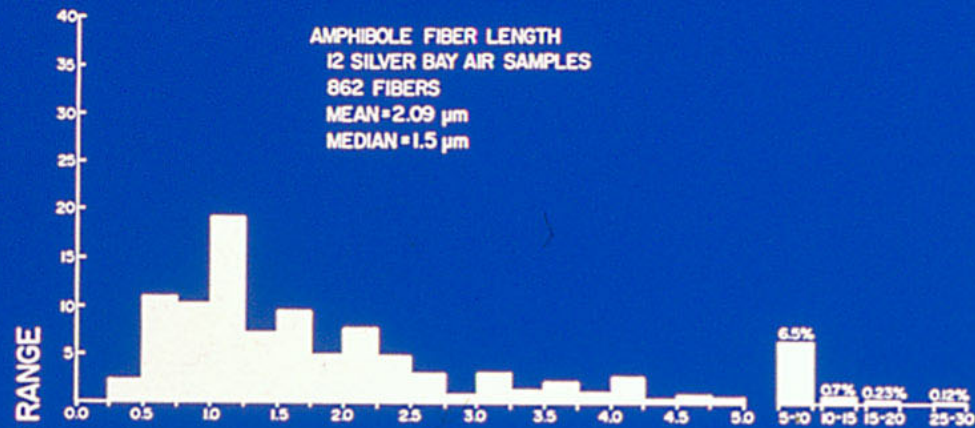
PHR12' ADD .020KEV/CH 60 SECS  
BUG= 4.500KEV, 220



1 micrometer



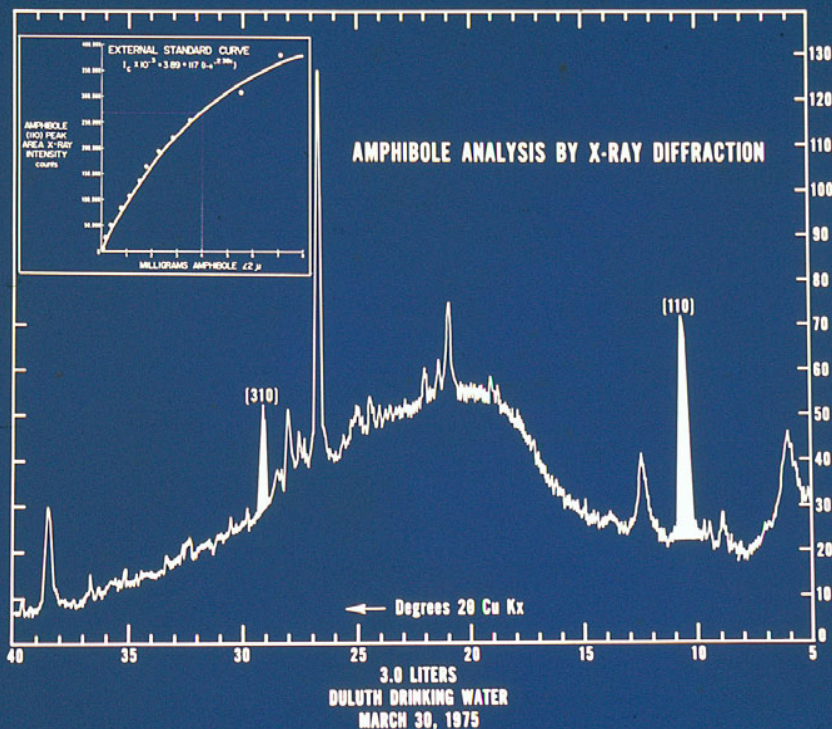
# Comparison of Amphibole Fiber Size Distributions - Air versus <20 um Tailings



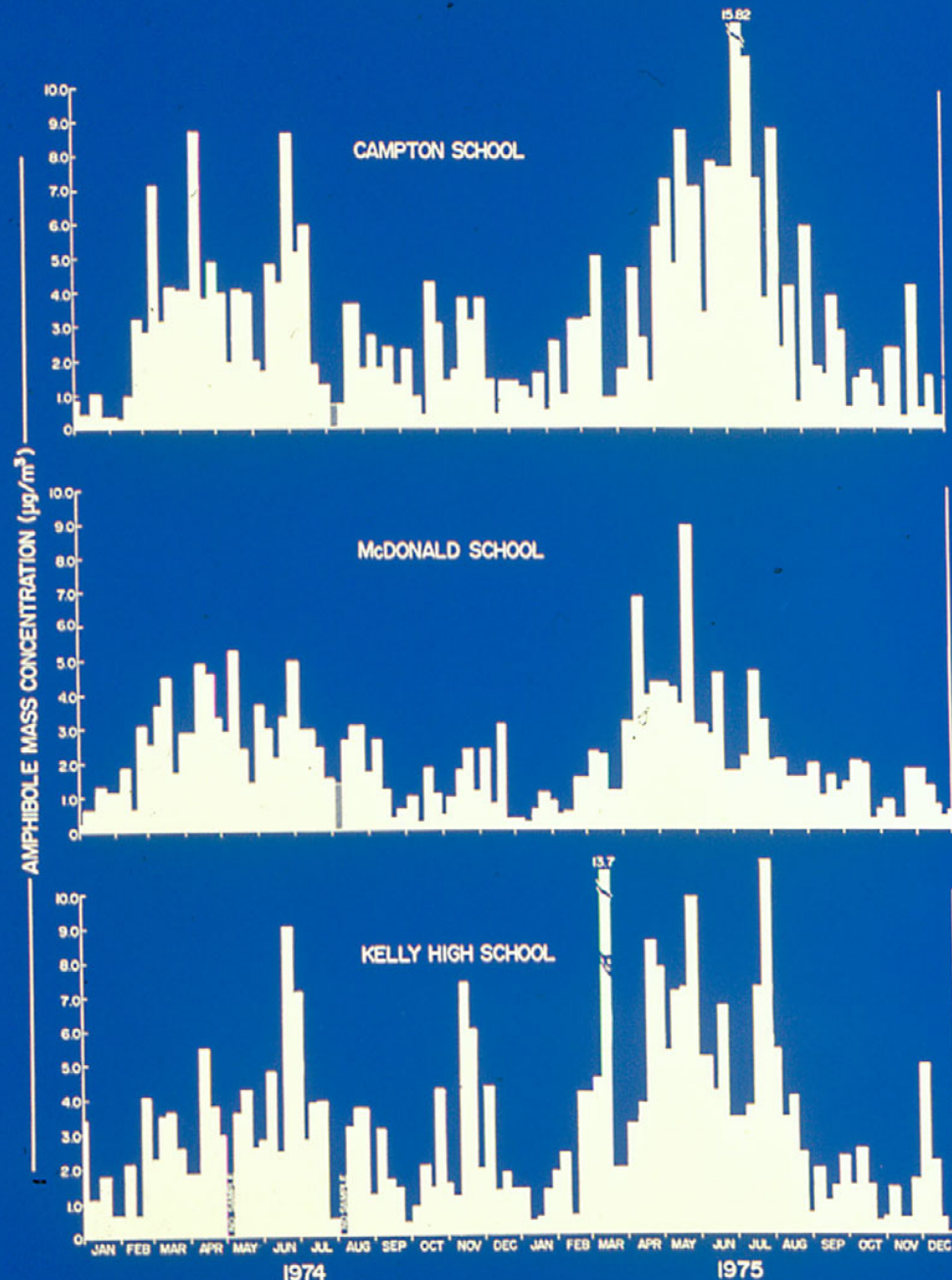
FIBER SIZE (Micrometers)  
FIBER SIZE DISTRIBUTION FOR SILVER BAY AIR SAMPLES



# XRD measurement of amphibole mass concentrations in community air from one week high volume air samples: a two year record for three sites

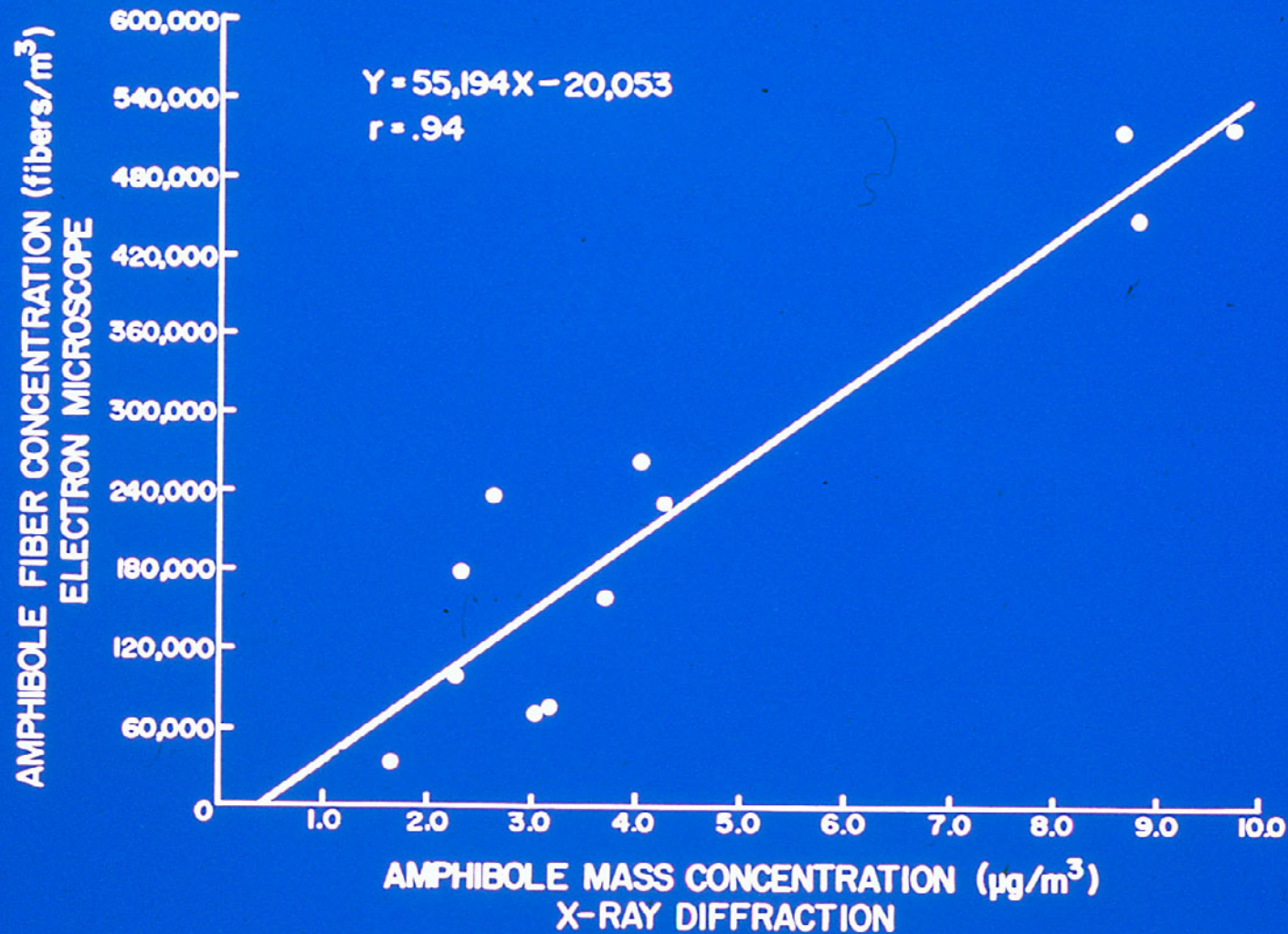


## AMPHIBOLE CONCENTRATIONS FOR WEEKLY AIR SAMPLES SILVER BAY, MINNESOTA





# Calibration of XRD Mass Concentration to TEM Fiber Concentration



**Table 1. MINNESOTA DEPARTMENT OF HEALTH SAMPLES  
COLLECTED AT SCHOOLS IN SILVER BAY**  
(amphibole fiber concentrations X 10<sup>-3</sup>)

Sample Number	Amphibole Conc ( $\mu\text{g}/\text{m}^3$ ) X-ray Diffraction	Amphibole Fibers/Cubic Meter					
		Mt Sinai	EPA/ERL-D	M D Health	Lab A	Lab B	Lab C
7144A	4.08	335	262	390	5.9	5.5	99
7144B	2.64	164	235	177	2.7	5.4	110
7144C	2.34	323	178	174	3.0	6.6	91
9040	8.74	384	513	450	3.9	12.8	100
9041	8.89	502	448	351	2.5	6.1	160
9042	9.82	583	516	569	.8	6.2	291
9061	1.66	53	33	67	1.0	1.6	74
9062	3.05	358	71	112	5.8	12.4	215
9063	3.19	240	76	120	.6	3.8	20
4221	3.73	252	158	138	4.4	10.4	50
4222	2.28	100	99	96	1.4	8.0	70
4223	4.3	394	230	221	3.2	20.6	84
AVERAGE		307	230	239	2.9	8.3	114

\*Samples were collected in December 1974 and March, May and August 1975 at each of three schools.